Safford Regional Airport
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Forecasts =

3.1 INTRODUCTION

Aviation demand forecasts presented in the Master Plan are the basis for identifying the type, size, and timing of airport facility requirements. For example, increases in based aircraft numbers may drive the need for more hangars while increased helicopter activity may require more helicopter parking. Further, aviation demand forecasts contribute to the assessment of potential environmental impacts as well as the operational feasibility of development alternatives.

The primary objective of this chapter is to forecast, by phase, Safford's based aircraft, aircraft operations, fleet mix, and peaking characteristics through the planning period (2020). Further, the Safford Regional Airport demand forecasts presented in this chapter are intended to update the 1990 Master Plan forecasts. This chapter compares activity levels forecast in the 1990 Plan with activity levels actually experienced through 1997.

The planning period for this update is divided into short-term (current to 2005), medium-term (2006 to 2010), and long-term (2011 to 2020).

The activity forecasts in this chapter should be used only as guidelines for the formation of a long-term development program for the airport. Implementation of recommended future facilities should take place upon reaching specific demand thresholds, as determined by the analysis of the capacity of existing airport facilities, rather than on an inflexible schedule based solely on these forecasts.

3.2 FORECASTING METHODOLOGY

Aviation demand forecasts are developed through a combination of mathematical, analytical, and judgmental techniques. Historical patterns are examined for trends and possible relationships between different conditions. From these, projections are made and then evaluated in comparison to forecasts from other sources.

Forecasts presented in this chapter resulted from the review and assessment of existing federal, state and local forecasts, the evaluation of historical and current activity data, and consideration of current socioeconomic trends. The forecasts include based aircraft, annual aircraft operations (including operation type and fleet mix), and airfield peaking characteristics.

The following summarizes the basic elements used in determining current and future aviation activity:

- · Identification of forecasting guidelines and assumptions
- Identification of airport service area
- Evaluation of available data on historical and current activity
- Consideration of current socioeconomic trends
- Testing of forecasting models (where input data is available)
- · Reviewing existing federal, state and local forecasts
- Interviewing airport-related staff

The results of the forecasting process provide input for the facility requirements analysis in the next chapter as well as all subsequent elements of this study.

3.2.1 Forecasting Guidelines and Assumptions

The following outlines the guidelines and assumptions used in the Safford Regional Airport demand forecasting effort:

- The base year for forecasting is 1997 (where data is available).
- Existing and historical annual operations and based aircraft figures are derived from airport estimates with other data sources identified for comparison.
- Forecasting results are based on unconstrained demand.
- Operations by type are estimated for current airport users to include general aviation, air taxi and military.
- Operations by fleet mix are estimated for aircraft currently operating at the airport to include single engines, multi-engines, jets, and helicopters.
- Peaking characteristics are based on airport estimates.

- Applicable FAA Advisory Circulars and other federal, state, and local published resources are used.
- The most current Department of Economic Security (DES) population statistics are used (as available during forecasting effort).

3.2.2 Airport Service Area

An Airport Service Area boundary is defined with respect to time and convenience associated with reaching other airport facilities. Factors associated with time and convenience include mileage, prevailing highway speeds, traffic flow and attractions in the area. The National Plan of Integrated Airport Systems (NPIAS) defines a service area as "reasonable access" to facilities in 30 minutes surface travel time (also commonly called door-to-door travel time). Since Safford does not have scheduled commercial service, the service area relates primarily to general aviation facilities. Based on this guidance, the Safford Regional Airport service area is identified as the City of Safford, Town of Pima, and Town of Thatcher. **Exhibit 3-1** geographically illustrates this service area. This area represents nearly half of the Graham County population. The service area is used to identify key socioeconomic characteristics for the forecasting effort. It is important to note that different communities may have overlapping service areas based on the location of various airport facilities.

For the purpose of the airport service area definition used, the Bylas and Ft. Thomas areas have been excluded. However, the City and airport acknowledge that there may be residents of those communities using the airport. For master planning purposes, the airport service area has been used to collect demographic data, which resulted in a current service area population of approximately 15,700. This data has been used for the aviation demand forecasts. For comparison, the current population for Bylas is estimated at approximately 1,760 while Ft. Thomas is not specifically listed in the DES population estimates.

3.2.3 Forecasting Models

Forecasting models are used to identify historical trends as well as relationships between aviation demand and other variables (e.g. population). Some of the typical forecasting models/techniques used for this purpose are described here:

- Market Share Analyses: This technique involves a review of aviation activity indicators in terms of a larger aviation market. The local share-of-the-market factor is then multiplied by forecasts of the larger total market, resulting in a projection of the local activity.
- <u>Correlation Analyses</u>: Examines the direct relationship between two or more sets of historic data. Used primarily as a statistical test on several variables, this analysis will detect significant relationships between sets of variables; the closer the relationship, the greater the degree of correlation. These sets of variables can then be evaluated further using several types of regression analyses.
- Regression Analyses: Projections of a specific aviation demand element (dependent variable) are prepared based upon its relationship to one or more other factors (independent variable) which influence aviation demand elements in question. Aircraft operations and based aircraft are examples of dependent variables, while population, per-capita income, or other socioeconomic factors are examples of independent variables. Linear, curvilinear, and multiple regression analyses can all be tested in an attempt to define the best relationship from which future activity can be projected.
- <u>Time Series</u>: This technique is the simplest, most widely used method of forecasting. The time series technique identifies trend lines based upon historic relationships extended into the future with the assumption that events in the past will continue to happen in the future.

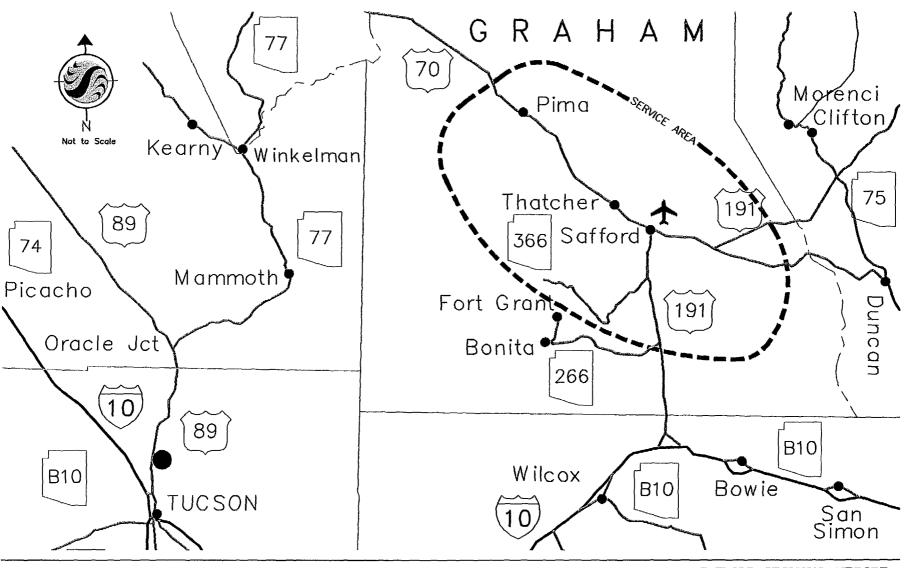
All four of these general forecasting techniques were integrated into more specific forecasting models defined for Safford.

The following is a summary of the Safford-specific models used to identify or dismiss specific aviation trends and relationships.

Historical Model: Measures the "trend" in Safford's based aircraft over the past six years and projects a straight-line continuation of this trend into the future.

Population Model: Establishes a statistical relationship (correlation) between Safford based aircraft and the population of the Airport Service Area and projects a continuation of this relationship into the future using population projections. This is the preferred forecast model.

Arizona Market Share Model 1: Establishes a statistical relationship between Safford based aircraft and total Arizona based aircraft and projects a continuation of this trend





SAFFORD REGIONAL AIRPORT Master Plan Update

EXHIBIT 3-1 Service Area into the future. This trend uses the projected Arizona registered aircraft growth rate of approximately 2% from the 1995 SANS (higher growth than recent trends).

Arizona Market Share Model 2: Establishes a statistical relationship between Safford based aircraft and total Arizona based aircraft and projects a continuation of this trend into the future. This trend uses a recent and fairly flat growth rate of .4%.

While an employment model can also serve to forecast aviation demand, Safford's recent employment trends have been quite variable while based aircraft have been more stable. Therefore, an employment model was not considered.

3.2.4 Preferred Forecasting Model

Of these forecasting models, the Population Model demonstrated the most reliable relationship. This model was selected for use in this Master Plan Update. A correlation has been established between population and based aircraft using 1997 based aircraft and airport service area population of 28 and 15,695, respectively. This is equivalent to approximately 1.8 based aircraft per 1,000 population. Based aircraft are then forecast using the most recent population projections published by Arizona Department of Economic Security (DES). It should be noted that earlier DES population projections as well as other sources of population forecasts have reflected lower growth rates for the service area. Use of such forecasts would result in a slightly lower based aircraft forecast. The following section presents the socioeconomic data evaluated as part of the forecasting effort.

3.3 SOCIOECONOMIC ACTIVITY

The anticipated economic future of the Safford Regional Airport Service Area is important to help determine the probable growth in Safford aviation activity.

This section briefly discusses what is known about the socioeconomic activity in the area to include population, economic base and employment, and per capita income.

3.3.1 Population

Service Area population estimates for 1990 to 1997 are summarized in **Table 3-1**. The population has increased by 2,800 over the past seven years. This translates to

approximately 22 percent growth while State population has grown approximately 25 percent for the same period. Exhibit 3-2 graphically illustrates the Service Area growth.

Table 3-1 **Historical Population Estimates**

Year	Safford	Thatcher	Pima	Service Area Total	% Change
1990	7,385	3,775	1,730	12,890	
1991	7,525	3,875	1,775	13,175	2.21%
1992	7,620	3,945	1,790	13,355	1.37%
1993	7,815	4,000	1,800	13,615	1.95%
1994	8,020	4,040	1,875	13,935	2.35%
1995	8,855	3,975	1,875	14,705	5.53%
1996	9,095	4,025	1,970	15,090	2.62%
1997	9,320	4,295	2,080	15,695	4.01%

Source: AZ Department of Economic Security (DES), 1997

18,000 16,000 14,000 12,000 Population □ Pima 10,000 ■ Thatcher 8,000 ■ Safford 6,000 4,000 2,000 1990 1991 1992 1993 1994 1995 1996 1997 Year

Exhibit 3-2 Service Area Population Trends

Since the Safford forecasting effort includes DES population projections, Table 3-2 presents the Service Area population forecast through the planning period. As shown,

population is expected to reach nearly 22,000 by the year 2020 – a 40 percent increase over current (1997) population levels. Population for the State is projected to increase 48 percent between 1997 and 2020.

Table 3-2
Forecast Population Estimates

Year	Safford	Thatcher	Pima	Service Area Total	% Change
2000	10,624	4,303	2,122	17,049	
2005	11,837	4,650	2,278	18,765	10.1%
2010	12,569	5,036	2,422	20,027	6.7%
2015	12,969	5,417	2,548	20,934	4.5%
2020	13,473	5,763	2,669	21,905	4.6%

Source: AZ Department of Economic Security (DES), 1997

3.3.2 Economic Base and Employment

Farming continues to be the chief economic contributor to the community. Cotton is the primary agricultural commodity. Livestock also makes a substantial contribution to the farm economy. Phelps Dodge Corporation, one of the largest copper producers of the world, employs over 2,000 in the region. While mining production in Graham County is now quite limited, Gila, Greenlee, Cochise and Pima Counties, all bordering on Graham County, account for 90 percent of Arizona's dollar volume in mining production. Astrophysical industries are expected to develop as spin-offs of the Mount Graham International Observatory (\$200 million site).

According to the Department of Commerce, retail trade and services continue to play a significant role in the economy of the area as Safford serves as a trade center for 55,000 to 60,000 people in a wide area of eastern Arizona and western New Mexico. Major employers in the area include the following:

- Arizona State Prisons System
- City of Safford (government)
- Eastern Arizona College
- Federal Prison Facility

- Impressive Labels
- Mt. Graham Hospital
- Safford Unified School District
- Wal-Mart

Recent historical employment figures for the service area are provided in **Table 3-3**. Employment for the service area grew approximately 16 percent between 1990 and

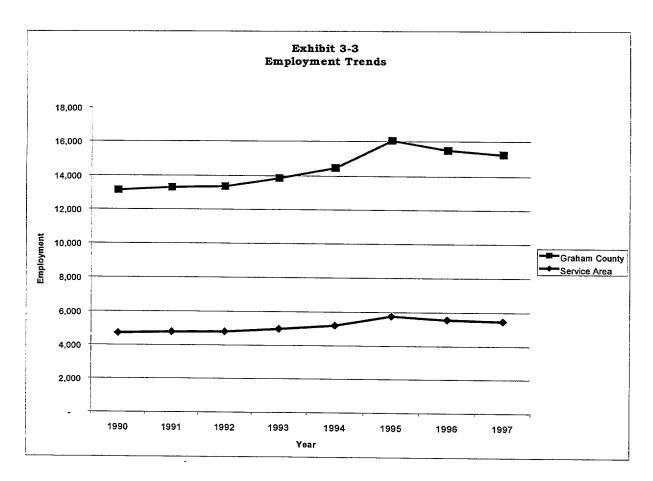
1997. This growth is six percent lower than the population growth for the same period shown in Table 3-1. **Exhibit 3-3** graphically illustrates the employment growth for the Service Area. For comparison, Graham County's employment growth is also illustrated.

Table 3-3 Historical Employment Estimates

Year	Safford	Thatcher	Pima	Service Area Total	% Change
1990	2,724	1,432	571	4,727	
1991	2,759	1,450	578	4,787	1.27%
1992	2,772	1,457	581	4,810	0.48%
1993	2,874	1,511	602	4,987	3.68%
1994	3,000	1,577	628	5,205	4.37%
1995	3,326	1,748	697	5,771	10.87%
1996	3,209	1,687	672	5,568	-3.52%
1997	3,157	1,660	661	5,478	-1.62%

Source: AZ Department of Economic Security (DES), 1997

Note: DES has indicated that these are rough estimates and may be inconsistent with other sources.



3.3.3 Income

While Safford aviation demand is not directly driven by fluctuations in income levels, this particular factor can indirectly influence aviation since income represents a part of the bigger socioeconomic picture of a community. According to the Bureau of Economic Analysis, Graham County's most recent per capita personal income figures show steady growth. Since 1995, per capita personal income has grown from \$11,919 to \$12,835 (1997) – a 7.7 percent increase. However, the State figures surpassed this growth with a 9.6 increase for the same period (\$20,078 to \$21,998).

3.4 AVIATION DEMAND FORECASTS

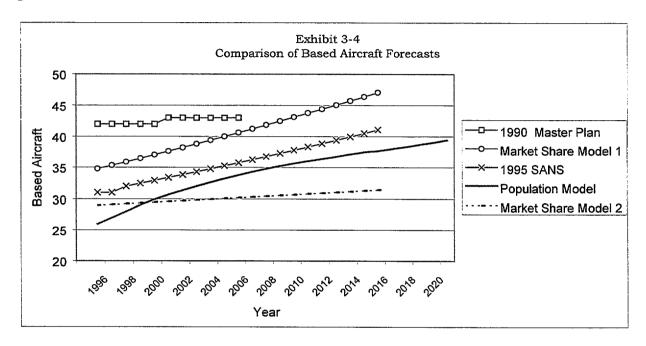
3.4.1 National Trends

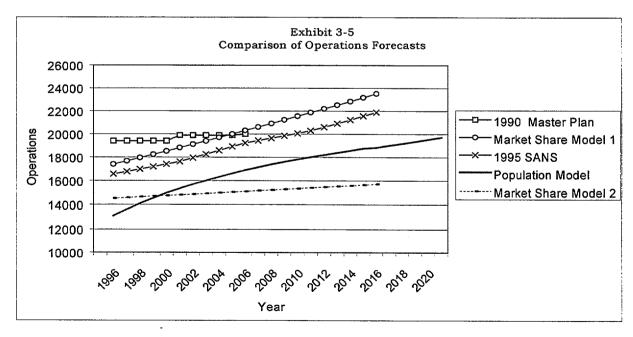
Since general aviation (GA) represents the largest aviation activity segment at Safford Regional Airport, it is important to understand this industry on a national level. The general aviation (GA) industry is a significant element of aviation. More than 90 percent of all U.S. airports and active aircraft are categorized as GA. Further, GA accounts for more than 70 percent of all aircraft operations.

The general aviation industry has been influenced by a number of factors over the years to include: airline deregulation in 1978; continued increases in the cost of owning and operating a general aviation aircraft (including purchase price, fuel and maintenance costs, product liability costs); reductions in leisure time and disposable income (particularly during the 1981 and 1990 economic recessions); consumer preferences; and increases in airspace restrictions applied to VFR aircraft. While these factors reduced demand for general aviation aircraft and subsequently impacted future growth in the general aviation fleet, this negative trend has seen a gradual upturn in recent years. This upturn has been partially attributed to the 1994 legislation termed the General Aviation Revitalization Act. This legislation established an 18-year product liability limit for general aviation aircraft manufacturers and consequently has helped initiate restoration to this previously healthy industry. In fact, the FAA Aviation Forecasts (1998-2009) cited a recent increase in active general aviation and air taxi aircraft (between 1994 to 1997) following earlier decreases (between 1992 and 1994). FAA projections reflect this continued positive trend through 2009. These positive trends are representative of the anticipated demand at the local and regional level, too.

3.4.2 General Aviation Demand

This section presents the GA demand forecasts for based aircraft and operations through the year 2020 for Safford Regional Airport. **Exhibits 3-4** and **3-5** illustrate, for comparison, the various based aircraft and operations forecasts for Safford Regional Airport as described in the sections that follow.





Historical

The accuracy of records on based aircraft and operations is questionable, and different sources provide inconsistent data. For example, Safford's January 1998 Airport Master Record (FAA Form 5010) indicates that 22 aircraft were based at the airport with 18,800 operations in 1997. According to airport staff, 1997 estimates included 28 based aircraft at the airport and 14,100 operations. Such inconsistencies are quite common amongst uncontrolled airports.

For the purpose of this study, the following estimated figures from airport staff for historical based aircraft and operations were used:

<u>Year</u>	Based Aircraft	<u>Operations</u>	<u>Year</u>	Based Aircraft	<u>Operations</u>
1990	23	11,500	1994	25	12,400
1991	24	11,850	1995	26	13,150
1992	24	12,000	1996	27	13,500
1993	25	12,400	1997	28	14,100

The 1995 State Aviation Needs Study (SANS) reflected 31 based aircraft and over 16,000 operations for 1995, while the airport states that based aircraft were closer to 26 or 27 and operations were 13,100 or 13,200 for the same period. Recent AirNav Website information provided for Safford identified an estimated 27 based aircraft (plus an ultralight) and approximately 18,615 annual operations for Safford.

1990 Master Plan Forecasts

The previous Airport Master Plan reflected 39 based aircraft for 1989, 40 for 1990, and a forecast of 43 based aircraft for the year 2005. Operations were identified as 17,850 for 1989 (base year), a total 18,400 for 1990, and 20,000 in the year 2005. This equates to 465 operations per based aircraft in 2005.

1995 State Aviation Needs Study (SANS)

The 1995 SANS forecast, calculated the number of based single engine aircraft for Safford using growth rate information contained in the previous master plan. Using based aircraft data available, the SANS projected 41 based aircraft for Safford in the year 2015. If this same growth rate were applied beyond 2015, a total of 44 based aircraft would result for 2020. The SANS does state that while Master Plans for Arizona

airports were used for forecasting, it is estimated that many forecasts are overstated based on industry trends.

The GA operations forecast in the 1995 SANS reflects a total of 21,907 operations in the year 2015, or 32% growth over the 20-year planning period covered in the Study (1995-2015).

These projected activity levels equate to an estimated 534 OPBA for Safford, slightly higher than the 504 OPBA calculated for the 1997 activity levels (per Safford FBO).

Current Master Plan Forecasts

As previously identified, the preferred forecasting model is the Population Model which established a ratio of 1.8 aircraft per 1,000 population. This results in a forecast of 39 based aircraft in 2020, an increase of 11 based aircraft over current 1997 figures of 28. This represents a total growth of 41 percent over 23 years (1997-2020) and 28 percent over 20 years (2000-2020). This growth is comparable to the 32 percent growth projected over 20 years in the 1995 SANS.

The current (1997) fleet mix of the Safford Regional Airport based aircraft includes 75 percent single engine and 25 percent multi-engine. This same percentage split is projected through the planning period (2020) which equates to 29 single engine and 10 multi-engine.

Once based aircraft projections are developed, a relationship between based aircraft and total annual airport operations is established. This is identified as an operations-per-based-aircraft (OPBA) relationship. As discussed in the 1995 State Aviation Needs Study, OPBA relationships for general aviation airports can have a significant range-typically anywhere from 200 to 1,000 OPBA. This does not imply that each based aircraft actually flies 500 annual operations, but rather it represents the character of the airport as a whole. A high OPBA could imply a high number of training operations are conducted at the airport. In other words, based or transient aircraft could be conducting numerous touch-and-go's. A low OPBA might indicate an airport with less training operations, less frequent transient aircraft operations, and/or less frequent activity by based aircraft operators.

Comparing the various historical sources of based aircraft and operations figures, OPBA ranged from 504 to 689. However, 500 is closer to the airport's estimates.

Operations forecasts are projected using the OPBA ratio. The current OPBA for Safford Regional Airport is 504. Rounded to 500 OPBA and projected through the planning period, this translates to approximately 19,710 operations in the year 2020.

Operations by type are forecast by first reviewing the current (1997) type split estimated by the airport to be:

GA Local 20%

GA Itinerant 56%

Air Taxi 9%

Military 15%

By 2020, GA operations are still expected to maintain a share of 76 percent of total operations. Military operations are projected to remain at current activity levels (2,200 operations annually) through the planning period which results in a decreased share (11 percent) of total operations and an increased share for air taxi operations (from current 9 percent to future 13 percent share).

3.4.3 Air Taxi Operations

Air taxi operations for 1997 are estimated at 1,200. Based on projected growth for airport operations through the planning period, air taxi operations will total 2,490 by the year 2020. Air taxi operations currently consist of 15 percent single engine aircraft and 85 percent multi-engine aircraft. This split is projected to remain through 2020. All air taxi operations are itinerant operations.

3.4.4 Military

Current (1997) military operations are estimated at 2,160 annually. This is significantly higher than the 200 estimated military operations identified in the 1995 SANS.

Military activity consists of both local and itinerant operations since the military does conduct training operations at Safford to include touch and go's. Military aircraft vary,

but primarily include King Airs and helicopters. Military traffic is projected to remain at current levels (approximately 2,200) through the planning period.

3.4.5 Air Cargo

United Parcel Service (UPS) currently operates an aircraft out of Safford for air cargo service. UPS flies approximately 250 days per year (one flight per day), with approximately one ton per flight. This translates to an estimated 500 operations and 250 tons of cargo annually. While there are no evident plans for expansion of the current operations, it is estimated that cargo operations and volume will follow the same growth patterns identified for other GA categories since such projections are tied to socioeconomic activity (i.e. population growth). Thus, air cargo activity is expected to reach nearly 700 operations and 350 tons by 2020. Air cargo operations are included in total GA operations activity. Other forecasting sources reviewed do not present air cargo projections for Safford.

3.4.6 Enplanements

The Safford Regional Airport is not served by scheduled commercial air service. However, according to the 1998 State Air Service Study, Copper State Airlines provided passenger service between Safford and Tucson in 1982. Operating an eight-seat Piper, the airline carried a total of 22 enplanements (109 departures) for the year. Today, the majority of the scheduled passenger service demand is accommodated by driving to Phoenix (68 percent) or Tucson (30 percent) with a small number of passengers driving to El Paso, Texas (2 percent). Phelps Dodge employees have historically used air charter service from Silver City, New Mexico, to fly to Phoenix to depart on scheduled airlines. The 1998 State Air Service Study also identified other potential users of Safford air service to include the Federal Bureau of Prisons, Impressive Labels, Open Loop Energy, Mt. Graham Hospital, Bureau of Land Management, University of Arizona, and Eastern Arizona Community College.

The State Air Service Study estimates that Safford may be able to capture, at most, 15 percent of its total unconstrained passenger service demand based on the close proximity of large jet service in Phoenix and Tucson. This translates to approximately 5,640 potential enplanements. Thus, for forecasting purposes, it is anticipated that Safford's scheduled passenger service demand will continue to be served primarily by

Phoenix and Tucson. However, the City supports the possibility of such service and, in the future, may strive to market for the same.

3.4.7 Total Operations Split and Fleet Mix

Based on the projected types of operations (GA Local/Itinerant, Air Taxi, and Military), the operations fleet mix can be defined. For Safford, single engine aircraft will remain the dominant aircraft traffic with an estimated 61 percent of total operations. Multiengine traffic is expected to increase slightly from its current 34 percent share of total operations to 35 percent by 2020. Jets are expected to represent approximately one percent of the total operations throughout the planning period with nearly 180 operations by 2020. Helicopter operations are projected to drop from four percent of total operations to three percent over the planning period since military and firefighting helicopter traffic is not anticipated to increase like other aviation elements. According to airport staff, helicopters currently operating at the airport include the Skycrane for firefighting operations and the Blackhawk and Apache for military operations. In addition, a Russian-built helicopter (gunship type) also flies in twice per month.

Although the local/itinerant operations split for GA was presented earlier, the military conducts local operations, too. All air taxi operations are itinerant. Therefore, the total local/itinerant split is projected to include GA and military activity. This equates to a 28/72 percent split for 1997 and a 26/74 percent split by 2020. Touch-and-go operations represent approximately 20 percent of the total local operations.

3.5 PEAK DEMAND

Calculation of peak aviation demand is important as it is one of the driving factors in determining facility requirements for an airport. Three key factors are presented for peak demand at Safford Regional Airport: peak month, average day of peak month, and peak hour.

Peak Month: It is estimated that the peak month (July) for aircraft operations at Safford Regional Airport represents approximately **10 percent** of total operations for the year. This represents **1,410** operations for existing activity levels and **1,970** for activity levels in the year 2020.

Average Day of Peak Month: Activity is calculated for the average day of the peak month by dividing the total peak month activity by the number of days in the month. This translates to **45** operations for 1997 and **64** operations for 2020.

Peak Hour (Design Hour): Peak hour activity levels are derived by multiplying an established percentage of the average day. For Safford Regional Airport, it is estimated that peak hour represents **15 percent** of the average day. Current (1997) peak hour operations are estimated at **seven**. Forecast peak hour operations total **10** for 2020.

Table 3-4 summarizes the calculation of peaking characteristics

Table 3-4
Peak Demand

	1997	2000	2005	2010	2015	2020
Total Operations	14,100	15,350	16,900	18,000	18,850	19,700
Peak Month	1,410	1,535	1,690	1,800	1,885	1,970
Average day of Peak Month	45	50	55	58	61	64
Peak Hour	7	8	8	9	9	10

These peaking characteristics are reviewed to determine future facility requirements such as transient aircraft parking. Such requirements are presented in the next chapter.

3.6 SUMMARY OF FORECASTS

Table 3-5 summarizes the aviation demand forecasts for Safford Regional Airport. As shown, positive growth is anticipated for all forecast elements. This growth is comparable to national trends and projections for general aviation.

Chapter 4 will translate this growth into future facility requirements for the Safford Regional Airport through 2020 and beyond.

Table 3-5 Summary of Forecasts

	1997			, , , , , , , , , , , , , , , , , , , ,		2020
	% Split	1997	2005	2010	2020	% Split
Based Aircraft		28	34	36	39	
SE	75%	21	26	27	29	75%
ME	25%	7	8	9	10	25%
Operations		14,100	16,900	18,000	19,700	
GA Local	20%	2,840	3,400	3,630	3,970	20%
GA Itinerant	56%	7,900	9,470	10,090	11,040	56%
Air Taxi	9%	1,200	1,830	2,080	2,490	13%
Military	15%	2,160	2,200	2,200	2,200	11%
ОРВА		504	500	500	500	
Operations Fle	et Mix					
SE	61%	8,641	10,336	11,009	12,035	61%
ME	34%	4,805	5,827	622	6,849	35%
Jets	1%	126	152	161	177	1%
Helicopters	4%	528	586	607	639	3%
		14,100	16,900	18,000	19,700	
Local/Itineran	t Split					
Local	28%	3,920	4,500	4,730	5,070	26%
Itinerant	72%	10,180	12,400	13,270	14,630	74%
Total						
Operations		14,100	16,900	18,000	19,700	